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# A Motivational Model of Performance-Enhancing Substance Use in Elite Athletes

**Eric G. Donahue,[1] Paule Miquelon,[2] Pierre Valois,[3] Claude Goulet,[4] André Buist,[4] and Robert J. Vallerand[1]**

[1]Université du Québec à Montréal; [2]McGill University; [3]Université Laval; and [4]Ministère de l'Éducation, du Loisir et du Sport, Gouvernement du Québec

Very little research has been done so far on the psychological determinants of performance-enhancing substance use in sports. The purpose of this study was to propose and test a motivational model of performance-enhancing substance use with elite athletes ($N$ = 1,201). The model posits that intrinsic and extrinsic motivation toward sport predict, respectively, positive and negative sportspersonship orientations, which in turn negatively predict the use of performance-enhancing substances. Participants completed a questionnaire assessing intrinsic and extrinsic motivation toward sport, sportspersonship orientations, and performance-enhancing substance use in the last 12 months. Findings supported the motivational model. The present findings support the role of intrinsic motivation and sportspersonship orientations in preventing athletes from engaging in unethical behavior such as the use of performance-enhancing substances. Future research should seek to replicate this model with professional and Olympic athletes.

***Key Words:*** intrinsic motivation, extrinsic motivation, sportspersonship orientations, performance-enhancing substances, self-determination theory

The use of performance-enhancing substances is perhaps one of the most significant problems in elite sports today (Turner & McCrory, 2003). Indeed, athletes who use such substances show not only a clear lack of respect for the rules of their sport but also gamble with their own physical and psychological health (Midgley, Heather, Davies, 2001; Midgley et al., 2000; Miller, Barnes, Sabo, Melnick, & Farrell, 2002). Surprisingly, very little research in sport psychology has studied the

Donahue and Vallerand are with the Laboratoire de Recherche sur le Comportement Social, Département de psychologie, Université du Québec à Montréal, Montréal, Québec, Canada; Miquelon is with the Psychology Department, McGill University, Montréal, Québec, Canada; Valois is with the Département des fondements et pratiques en éducation, Faculté d'éducation, Université Laval, Québec, Canada; Goulet and Buist are with the Direction de la promotion de la sécurité, Ministère de l'Éducation, du Loisir et du Sport, Québec Government.

psychological processes leading to the use of performance-enhancing substances (for a review, see Donovan, Egger, Kapernick, & Mendoza, 2002).

We believe that a motivational analysis should allow us to identify some of the underlying processes responsible for such unethical behavior in sports. In line with Vallerand and Losier (1994), we propose that *why* athletes engage in sports (the motivational part) can influence *how* they play the game (their sportspersonship orientations; Vallerand, Deshaies, & Cuerrier, 1997; Vallerand, Deshaies, Cuerrier, Brière & Pelletier, 1996). In turn, how one plays the game should determine the use (or not) of performance-enhancing substances. Specifically, we posit that athletes who are intrinsically motivated behave primarily in line with their true self (Deci & Ryan, 2000) and seek to satisfy their psychological needs of competence (to function effectively), autonomy (having a sense of personal initiative), and relatedness (connecting with others). For these athletes, the enjoyment is in the process of trying to improve and do well through appropriate means, to choicefully act in line with one's goals and values, and of connecting with others in their sport, not by winning at all costs. Thus, for them, to use performance-enhancing substances would run counter to their psychological needs as it would lead them to achieve competence artificially, to act against their sense of autonomy by engaging in behaviors that run counter to their goals and values, and to disconnect from other athletes by cheating and taking unfair advantage of them. Intrinsically motivated athletes should therefore be more likely to behave in line with their sense of self and internalized values, which would include respect for others and themselves (sportspersonship orientations) and, in turn, to be less likely to use performance-enhancing substances. Conversely, athletes who are extrinsically motivated in a non-self-determined fashion (Deci & Ryan, 2000) do not seek as much to satisfy their psychological needs. Rather, they would appear to primarily seek to gain fame and extrinsic rewards as substitute for those needs (Deci & Ryan, 2000). They do not focus as much on the process of the game, but rather on the outcome, which serves to reach their goals of gaining fame and rewards and to nourish their contingent self-esteem (Deci & Ryan, 1995). Extrinsically motivated athletes thus focus primarily on the end result, on winning at all costs. Such a motivational orientation should lead them to be more likely to use all means possible to reach success, including cheating. They would therefore be more likely to adopt unsportspersonship orientations and eventually to use performance-enhancing substances.

Research is supportive of parts of the proposed sequence (see Vallerand, in press). For instance, Vallerand and Losier (1994) showed that hockey players who engaged in their sport out of self-determined motivation (engaging in sport out of pleasure and choice; see Vallerand, 1997) displayed increases in sportspersonship orientations over the course of the season. These findings have been replicated over a 12-month period with physical education students (Chantal & Bernache-Assolant, 2003). Furthermore, conditions that have been found to facilitate intrinsic motivation, such as playing in a task-involving climate, have also been found to be positively associated with sportspersonship orientations (Boixados, Cruz, Torregrosa, & Valiente, 2004; Fry & Newton, 2003; Lemyre, Roberts, & Ommundsen, 2002; Miller, Roberts, & Ommundsen, 2004).

Unfortunately, to the best of our knowledge, no study has looked at the relationship between sportspersonship orientations and performance-enhancing substance use. However, some research reveals that unsportspersonship orientations are positively associated with cheating, rough play, and reactive aggression (Boixados et al., 2004; Chantal, Robin, Vernat, & Bernache-Assollant, 2005). If unsportspersonship orientations predict such a variety of negative behaviors, they may also predict the display of another form of unethical behavior, namely, the use of performance-enhancing substances.



The purpose of this study was to propose and test a motivational model on the use of performance-enhancing substances with male and female elite athletes. Specifically, the model posits that athletes with an intrinsic motivation toward sport are more likely to display positive sportspersonship orientations, whereas athletes with an extrinsic motivation are less likely to hold such orientations. In turn, positive sportspersonship orientations should negatively predict the use of performance-enhancing substances.

# Method

## Participants

Participants were 1,290 national-level athletes (males = 637; females = 650; 3 unknown). They were members of teams representing the Province of Quebec in a variety of sports (baseball, gymnastics, swimming, basketball, hockey, skiing, athletics, soccer, speed skating, etc). The average age of the participants was 16.3 years ($SD$ = 2.43), ranging from 10 (1 athlete) to 20 years and more (216 athletes). On average, these participants practiced 5 to 6 times per week for an average of 14.7 weekly hours ($SD$ = 7.80).

## Questionnaire

***Sport Motivation.*** Two subscales of four items each from the Sport Motivation Scale (SMS; Brière, Vallerand, Blais, & Pelletier, 1995) were used to assess intrinsic motivation ($\alpha$ = .73) and extrinsic motivation ($\alpha$ = .67). A combination of items of intrinsic motivation to experience stimulation ("For the pleasure I feel in living exciting experiences"), to know ("For the pleasure of discovering new training techniques"), and toward accomplishment ("For the satisfaction I experience while I am improving my abilities") were used to assess intrinsic motivation, whereas the non-self-determined extrinsic motivation subscale comprised items assessing external regulation ("For the prestige of being an athlete") and introjected regulation items ("Because it is absolutely necessary to do sports if one wants to be in shape"). This scale was scored with a 5-point Likert scale, ranging from 1 (*Does not correspond to me at all*) to 5 (*Corresponds exactly to me*). The SMS has been found to represent a valid and reliable measure of motivation in sport (Brière et al., 1995; Pelletier et al., 1995).

***Sportspersonship Orientations.*** Two subscales of five items each from the Multidimensional Sportspersonship Orientations Scale (MSOS; Vallerand, Brière, Blanchard, & Provencher, 1997) were used: respect and concern for the rules and officials, such as "I respect the rules" ($\alpha$ = .85), and respect for social conventions, such as "After a loss, I congratulate the opponent" ($\alpha$ = .83). These two subscales were combined ($\alpha$ = .88). This scale was scored with a 5-point Likert scale, ranging

from 1 (*Does not correspond to me at all*) to 5 (*Corresponds exactly to me*). The MSOS has been found to represent a valid and reliable measure of sportspersonship orientations (Vallerand et al., 1997).

***Performance-Enhancing Substance Use.*** This scale asked athletes' utilization of 30 different substances to specifically improve their athletic performance in the last 12 months (creatine, Tylenol, anabolic steroids). It was measured with a 5-point Likert scale, ranging from 0 (*No*) to 4 (*Yes, I use it regularly*). Of these 30 different substances ($\alpha = .92$), 15 are currently banned by the International Olympic Committee (IOC) (e.g., growth hormones, amphetamines, anabolic steroids; $\alpha = .92$). A total score was created for each scale (i.e., the 30 and the 15 banned substances) by summing the ratings across the number of substances and dividing by the number of substances in the scale. The model was estimated separately for these two substance use scales.

***Demographic Variables.*** Participants completed a demographic section with questions dealing with age, gender, and number of weekly practices.

## Procedure

Participation in this survey was voluntary. Preceding the survey, a consent form was signed by the athletes. Parental approval was obtained for participants who were 13 years old and younger. The questionnaires were sent by mail to the Sports-Quebec Association and then redistributed to the athletes. The questionnaire was filled out individually in the absence of the experimenter. These procedures are in accord with the ethical requirements in place at the Ministère de l'Éducation, du Loisir et du Sport of the Government of Québec (Québec Ministry for Education, Leisure, and Sport). The questionnaires were returned to the association and then sent back to the experimenter. The return rate was 57.5%.

# Results

Because of missing values, the hypothesized model was tested with 1,201 athletes. Table 1 presents the means and standard deviations, as well as the correlation matrix among all variables. The hypothesized model was tested using a path analysis (i.e., a structural model with observed variables) with LISREL 8 (Jöreskog & Sörbom, 1996). The covariance matrix served as database for the path analysis and the method of estimation was maximum likelihood. As shown in Figure 1, the model was composed of two exogenous variables (i.e., intrinsic and extrinsic motivation toward sport) and two endogenous variables (i.e., sportspersonship orientations and substance use). Paths were specified according to the hypotheses of the theoretical model. In addition, a positive covariance was estimated between intrinsic and extrinsic motivation.

To test for the mediating role of sportspersonship orientations in the relationship between motivation and performance-enhancing substance use, we conducted additional analyses following the recommendations of MacKinnon, Lockwood, Hoffman, West, and Sheets (2002). Specifically, we used the $z'$ coefficient resulting from the division of the mediated, or indirect effect (which is the product of the two path coefficients involved in the effect), by its standard error. Then, this $z'$



**Table 1 Means, Standard Deviations, and Pearson Correlations Among the Model Variables ($n$ = 1,201)**

| Variables | *M* | *SD* | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|
| 1. Intrinsic motivation toward sport | 4.11 | 0.79 | | | | |
| 2. Extrinsic motivation toward sport | 2.90 | 1.02 | .29** | | | |
| 3. Sportspersonship | 4.12 | 0.73 | .39** | .03 | | |
| 4. Drug use | 0.25 | 0.33 | −.06* | .11** | −.23** | |
| 5. Drugs banned by the IOC | 0.05 | 0.21 | −.05 | .06* | −.16** | .72** |

*$p < .05$, **$p < .01$.

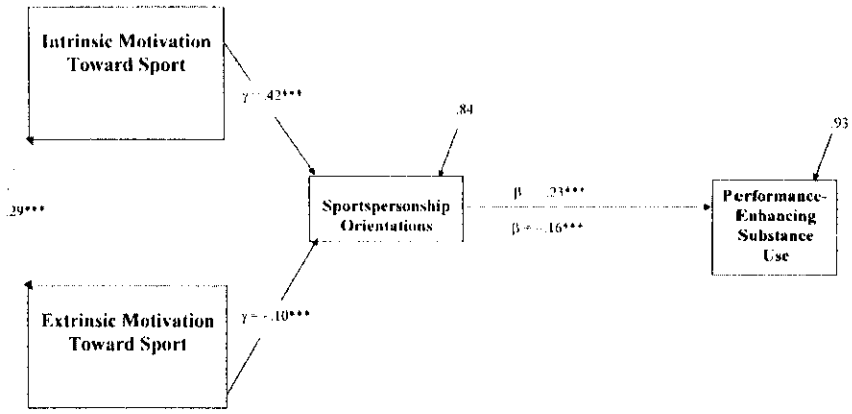


**Figure 1** — Results of the path analysis of the motivational model on the use of performance-enhancing substances. Values on the top of the arrows refer to the use of the 30 types of performance-enhancing substances; values below the arrows pertain only to substances banned by the IOC. *** $p < .001$.

value is compared with critical values derived from this product term's empirical sampling distribution (see MacKinnon et al., 2002). The coefficients and standard errors used in this test are obtained from a supplemental path analysis in which the direct paths from motivation toward sport (i.e., intrinsic and extrinsic) to performance-enhancing substance use are estimated. Significant indirect effects are analogous to showing that the direct effects are significantly reduced when the mediator (i.e., sportspersonship) is included in the equation.

The results of the first path analysis conducted with the 30 substance use variable revealed a satisfactory fit of the model to the data (see Figure 1). Although the chi-square value was significant,[1] $\chi^2(df = 2, N = 1201) = 17.34$, $p = 0.00001$, other fit indices were satisfactory, with the comparative fit index (CFI) = .96, the goodness-of-fit index (GFI = .99), and the root mean square error of approximation (RMSEA) = .08 (.048; .10) indicating support for the hypothesized model. As shown in Figure 1, the estimated path between intrinsic motivation and sportspersonship orientations ($\gamma = .42$) was significant and positive ($t$ value > 3.29). Additionally, the estimated path between extrinsic motivation and sportspersonship orientations ($\gamma = -.10$) was also significant ($t$ value > 3.29) but negative. Finally, the estimated path between sportspersonship orientations and the use of the 30 performance-enhancing substances ($\beta = -.23$) was significant ($t$ value > 3.29).

In order to assess the mediating role of sportspersonship orientations in the relationship between motivation toward sport and performance-enhancing substance use, we used the $z'$ coefficient presented above (see MacKinnon et al., 2002). With respect to the mediating role of sportspersonship in the relationship between intrinsic motivation toward sport and performance-enhancing substance use, the $z'$ coefficient = −7.57, $p < .01$, was significant. We also examined the mediating role of sportspersonship orientations in the relationship between extrinsic motivation toward sport and performance-enhancing substance use with the $z'$ coefficient. For this mediation, the $z'$ coefficient was also significant ($z' = -.99$, $p < .05$).

The model was also tested with respect to the 15 substances banned by the IOC. The results of the path analysis revealed a highly satisfactory fit of the model to the data. The chi-square value was not significant, $\chi^2(df = 2, N = 1,201) = 4.43$, $p > .05$, and other fit indices were also satisfactory: CFI = .99, GFI = 1.00, and RMSEA = .042 (.00; .07). The only value that differed from the first analysis was the estimated path between sportspersonship orientations and the IOC banned drug use ($\beta = -.16$). The path was significant and appears under the arrow in Figure 1.

Mediating analyses were also performed with respect to the 15 performance-enhancing substances banned by the IOC. Although the correlation involving intrinsic motivation and substances banned by the IOC was close to zero (i.e., $r_{1,201} = -.05$, $p > .05$), we nonetheless examined the mediating role of sportspersonship in the relationship between these two variables (see Judd & Kenny, 1981 to this effect).[2] For this mediation, we found that the $z'$ coefficient was significant ($z' = -4.55$, $p < .05$). Likewise, we also examined the mediating role of sportspersonship orientations in the relationship between extrinsic motivation and substances banned by the IOC and found the $z'$ coefficient to be significant ($z' = -0.98$, $p < .05$).

## Discussion

The purpose of this study was to test a motivational model on the use of performance-enhancing substances with elite athletes. The model hypothesized that intrinsic motivation toward sport should facilitate sportspersonship orientations, whereas extrinsic motivation should undermine them. In turn, sportspersonship orientations should negatively predict the use of performance-enhancing substances. Results from structural equation modeling analyses supported the model and revealed that all hypothesized paths were significant. In other words, athletes who are primarily intrinsically motivated were more likely to endorse sportspersonship orientations and consequently less likely to use performance-enhancing substances. Conversely, extrinsically motivated athletes were more likely to use performance-enhancing substances in sport in part because of the unsportspersonship orientations they hold.



The present results provide support for past research on the relationship between motivation and sportspersonship orientations. More specifically, Vallerand and Losier (1994) have demonstrated that self-determined motivation positively predicts increases in athletes' sportspersonship orientations that take place over time. These findings were conceptually replicated in the present study in that intrinsic and extrinsic motivation were, respectively, found to positively and negatively predict sportspersonship orientations. Furthermore, the present findings showed that sportspersonship orientations were negatively associated with the use of performance-enhancing substances. These findings are in line with past research that has shown sportspersonship orientations to negatively predict unethical behavior, such as cheating, rough play, and reactive aggression (Boixados et al., 2004; Chantal et al., 2005). It should be underscored, however, that the present study is the first to show that holding low levels of sportspersonship orientations is positively associated with the use of performance-enhancing substances.

The present findings have some implications for a better understanding of intrinsically and extrinsically motivated athletes. The present results revealed that intrinsically motivated athletes are more likely to have internalized sportspersonship orientations and in turn are less likely to use performance-enhancing substances than are extrinsically motivated athletes. These findings are in line with self-determination theory (SDT; Deci & Ryan, 2000), which posits that intrinsically motivated athletes are more likely to behave in line with their psychological needs of competence, autonomy, and relatedness and internalized adaptive inner values such as sportspersonship orientations. Consequently, they should make less use of performance-enhancing substances than would extrinsically motivated athletes. Although the present findings are indeed supportive of such an analysis, it should be underscored that need satisfaction was not assessed in the present study. Thus, a more complete test of the above hypothesis must await future research.

This study has some limitations. First, although the present results fit the proposed model, it is nevertheless inappropriate to make causal inferences. One would need the use of an experimental design in order to do so. Second, it should be underscored that self-report scales were employed to assess the use of performance-enhancing substances in the present study. Such scales may be subject to response bias. Moreover, no experimenter was present during the testing. Thus, we had no control over the conditions under which the athletes completed the questionnaire. Although such a methodological strategy may have affected the data, it should be noted that questionnaire completion was completely anonymous. Furthermore, the fact that participants were not observed while completing the questionnaire may have encouraged them to complete it even more honestly. Future research should replicate the present findings while using actual behavior or even blood analysis to more objectively assess the use of performance-enhancing substances. Third, one should also note that some substances may be more likely to be used as a function of age (e.g., steroids). Although internal analyses did not reveal any differences as

a function of age, some subtle effects may nevertheless exist. Fourth, the present study employed elite athletes at the national level. Future research is needed in order to further test the motivational model with professional and world-class athletes.

Finally, it is important to point out the limited amount of variance in sportspersonship orientations explained by extrinsic motivation. These findings may be due to the relatively low reliability ($\alpha = .67$) of the extrinsic motivation scale used, which was made up of two types of extrinsic motivation (external and introjected regulation). Future research would do well to use a more complete and separate assessment of the different types of extrinsic motivation, thus enhancing the reliability of the various extrinsic motivation scales used. In addition, such a methodological strategy could provide a more refined analysis of the role of extrinsic motivation in the adoption of sportspersonship orientations. In line with SDT (Deci & Ryan, 2000), such research may reveal that because of their high levels of inherent self-determination, some forms of extrinsic motivation, such as identified regulation, may facilitate the adoption of sportspersonship orientations and thus indirectly prevent the use of performance-enhancing substances. Thus, the negative relationship between extrinsic motivation and sportspersonship orientations and associated substance use would be limited to non-self-determined forms of extrinsic motivation (external and introjected regulation). This hypothesis awaits future research.

In sum, the present findings represent the first to provide support for a motivational analysis of the use of performance-enhancing substances. It appears that *why* one plays the game (i.e., motivation) predicts *how* one plays the game (i.e., sportspersonship orientations), which then predicts the use (or not) of performance-enhancing substances. Future research is needed, however, in order to replicate and extend these findings thereby allowing us to better understand the psychological processes underlying such unethical behavior in athletes.

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## Notes

1. It should be underscored that a significant chi-square in structural equation modeling indicates lack of support for the hypothesis. That is, the hypothesis tested is that there is *no* difference between the theoretical model and the observed data. However, much research reveals that the chi-square statistic is highly sensitive to the number of participants with high numbers often yielding significant values. It is thus recommended to look at the overall set of fit indices in order to determine whether there is support for the conceptual model (Kline, 2005).

2. Judd and Kenny (1981, p. 207) acknowledged the possibility that mediation does exist, even in the absence of a significant relationship between the independent and the dependent variables.



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## Ouch!: What Type of Imagery Helps During Injury Rehabilitation?

The purpose of this study was to explore athletes' use of imagery within a temporal context. Specifically, Evans et al. were interested in the use of imagery by injured athletes across their rehabilitation. Purposeful sampling was used to recruit four athletes competing at the semiprofessional or international levels who had (a) sustained a sports injury that required at least 8 weeks of rehabilitation and (b) regularly used imagery as part of their normal training and performance preparation. A semistructured interview guide was used to explore the athletes' use of performance imagery, rehabilitation imagery, and experiences at three phases during the recovery process (early, middle, and late). The interview transcripts were inductively content-analyzed and organized into interpretable and meaningful themes for each phase. Results revealed that two of the four participants used cognitive specific (CS) imagery to rehearse sport skills and strategies during the early phase of rehabilitation, and three of the four admitted to being unable to control some of their images because of involuntary negative flashbacks of the injury occurrence. In the mid phase of rehabilitation, three of the athletes reported using performance imagery, which primarily took the form of CS imagery, to reduce pain. They attributed the increase use of imagery to the need to counteract their physical and medical concerns. During the end phase, all of the athletes used performance imagery directed toward the rehearsal of specific skills (CS) and to a lesser extent cognitive general (CG) imagery (i.e., strategies). The athletes indicated that CS and CG imagery helped maintain a positive attitude and augment their confidence to return to preinjury status. The authors suggest that imagery use could be facilitated by providing athletes with visual and detailed descriptions of their injury and healing process.

Evans, L., Hare, R., & Mullen, R. (2006). Imagery use during rehabilitation from injury. *Journal of Imagery Research in Sport and Physical Activity, 1*, 1-19.

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## Move It or Lose It!: Pedometers to Increase Older Adults' Physical Performance and Self-Efficacy

Older adults' physical performance and mobility-related self-efficacy was examined prior to, during, and after a 12-week physical activity pedometer-based intervention. Two groups received the intervention at different times. Group A received the intervention during the first 12 weeks, whereas the Group B remained on a waiting list (control period). Group B received the intervention during the second 12 weeks,